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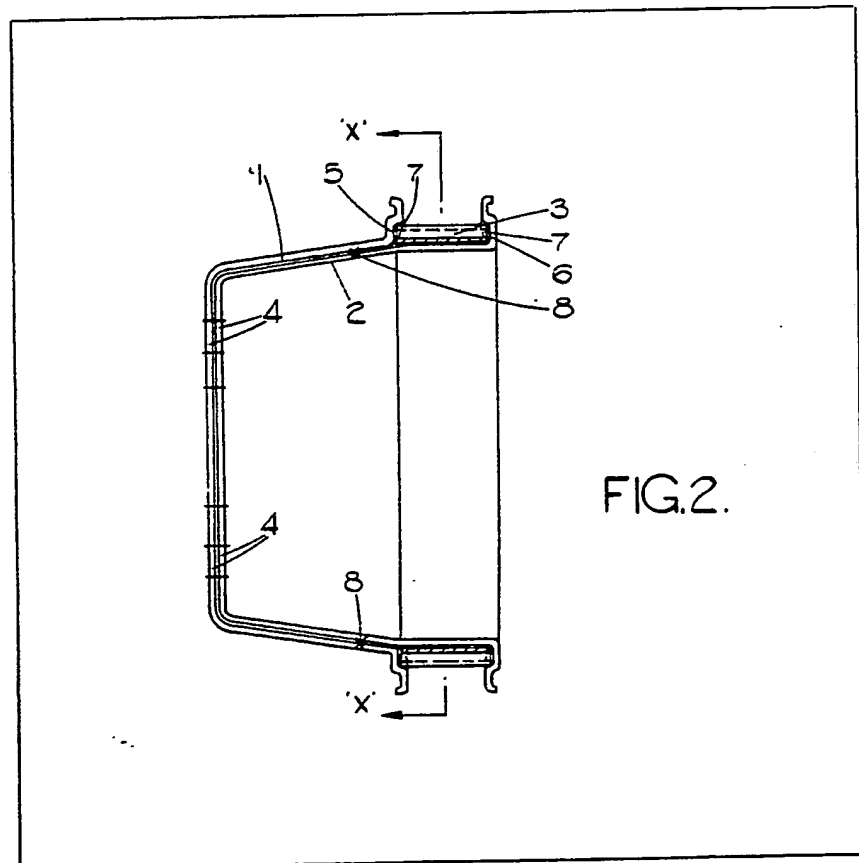
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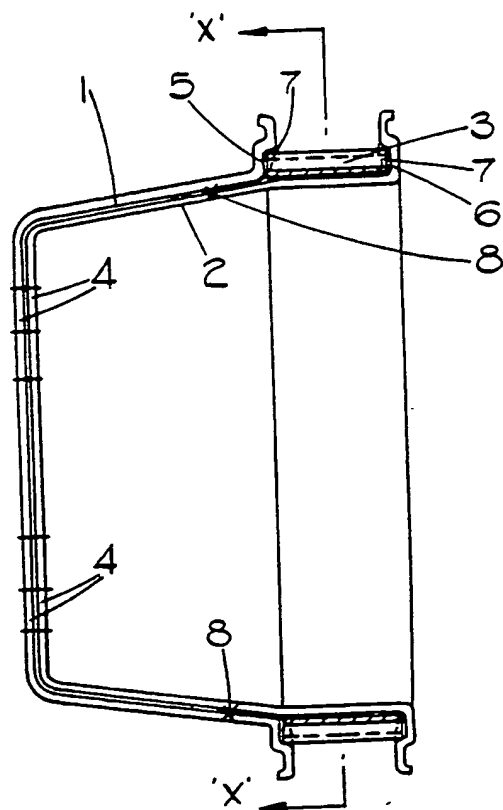
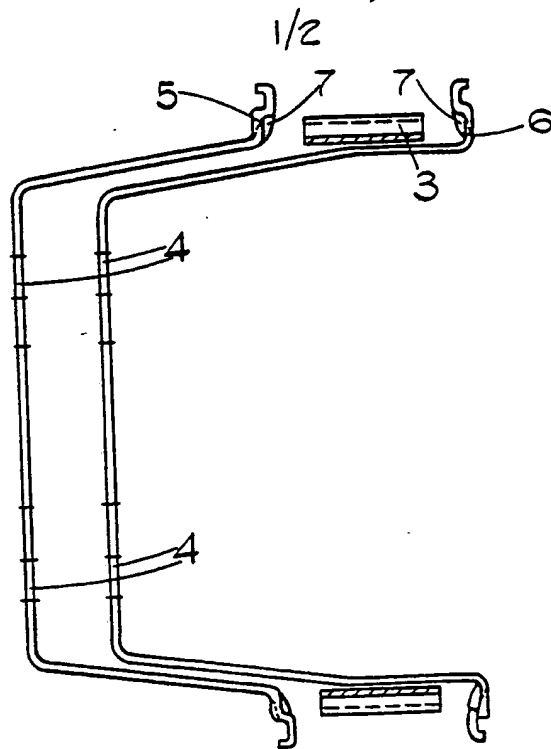
(54) Pulley

(57) A toothed pulley for use in a motor vehicle is economically produced from a pair of cup-shaped, mild steel flanges 1 and 2, and an externally toothed ring 3. The flanges 1 and 2 are nested together with the ring 3 between spaced apart outer portions thereof. The flanges 1 and 2 are crimped at 7 to secure the toothed ring 3 against rotation relative to the flanges 1 and 2. The inner portion of the flanges 1 and 2 are engaged with a rotary drive or drive member and are spot welded at 8 so as to be in facial engagement.



The drawing(s) originally filed was/were informal and the print here reproduced is taken from a later filed formal copy.

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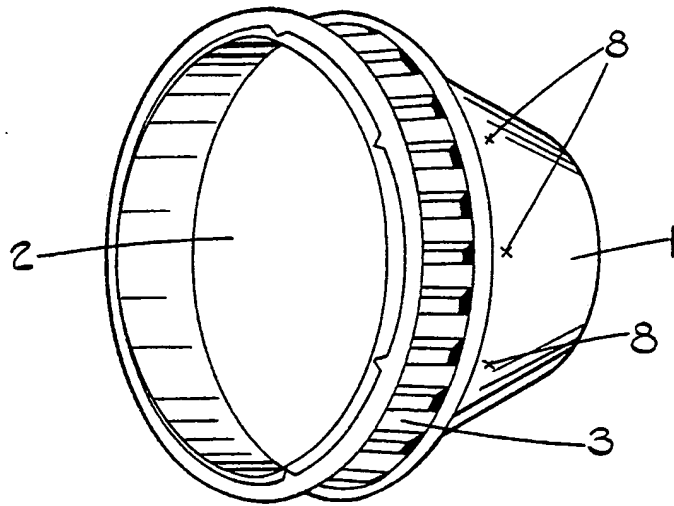


FIG. 3.

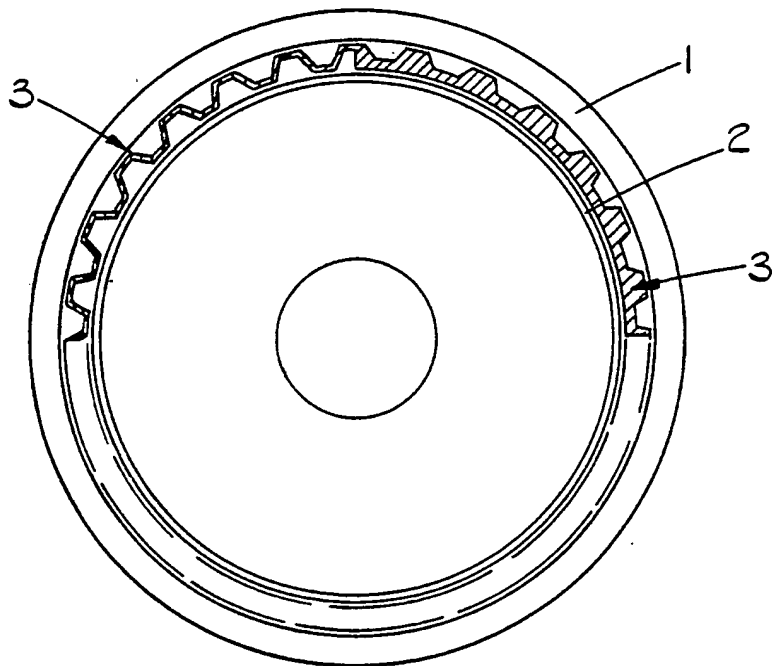


FIG. 4.

SPECIFICATION

Pulley

5 This invention relates to toothed pulleys and is particularly, though not exclusively, to pulleys for driving a cooling fan and a water pump in a motor vehicle.

10 It is an object of the present invention to provide a toothed pulley which is of light-weight construction and economical to manufacture.

15 According to the present invention, there is provided a pulley comprising a pair of flanges which are spaced apart axially of the pulley over peripheral portions thereof but which are configured so as to be in facial engagement over an inner portion thereof which is to be engaged with a rotary drive or driven member, and an externally toothed ring which is mounted between the spaced apart portions of the flanges and which is secured to the flanges.

20 Most advantageously, each flange has an annular recess adjacent its periphery, said recess receiving a respective side edge of the toothed ring. A pulley construction which is particularly economic to manufacture is one in which the flanges have been subjected to a crimping operation to secure the toothed ring thereto.

25 The toothed ring may be produced by forming a strip having teeth thereon into a ring, although it is more preferably produced by forming a strip into a ring and then subjecting the ring to a deforming operation to form the teeth thereon.

30 Where the teeth of the pulley are required to withstand particularly heavy wear, it may be preferred for the toothed ring to be produced by extruding a cylinder having solid teeth which extend in the extrusion direction, and then cutting rings of the desired width from the cylinder.

35 In any event, the teeth may be subjected to any desired hardening operation in order to render them more resistant to wear.

40 It is within the scope of the present invention to form the teeth from metal or from a plastics material which may or may not be reinforced.

45 An embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

50 *Figure 1* is an exploded axial section of one form of toothed pulley according to the present invention,

55 *Figure 2* is an axial section of the assembled pulley of *Fig. 1*,

Figure 3 is an isometric view of the pulley of *Fig. 2*, and

60 *Figure 4* is a cross-sectional view on the line X-X of *Fig. 2* showing two embodiments of toothed ring.

Referring now to the drawings, the toothed pulley is a driven pulley for operating a fan and a water pump in a motor vehicle. Basically, the pulley comprises two cup-shaped, mild steel flanges 1 and 2, and an externally toothed ring 3. The flanges 1 and 2 are nested together in facial abutment except over outer peripheral portions thereof where they are spaced apart. The flanges 1 and 2 are provided with aligned apertures 4 there-through to enable the pulley to be bolted to a rotary driven member (not shown) in a manner known *per se* to enable the water pump to be driven, the bolts also serving to secure the fan to the pulley. The outer peripheral portions of the flanges 1 and 2 are provided with respective annular recesses 5 and 6 which receive respective side edges of the ring 3. The ring 3 is secured against rotation relative to the flanges 1 and 2 by means of localised deformations 7 integral with the respective flanges 1 and 2. The localised deformations 7 terminate within the respective recesses 5 and 6 and each deformation 7 is disposed in the gap between two adjacent teeth on the ring 3.

70 In this embodiment, the toothed ring 3 is formed by cutting a steel strip to the required length, rolling the cut length of strip to form a ring, spot welding the ends of the strip together to form a continuous ring, and then forming teeth in the pre-formed ring. With this form of ring, the teeth are hollow (as shown in the left hand upper quadrant of *Fig. 4*). If solid teeth are required (as shown in the right hand upper quadrant of *Fig. 4*), then the ring 3 may be produced by an extrusion operation as previously described.

The sequence of assembly operations to produce the pulley is as follows:-

105 1) The cup shaped flanges 1 and 2 are each pressed or spun formed from a mild steel blank.

2) The toothed ring 3 which has been formed as described above, is inserted onto the flange 2 until one of its side edges engages in the recess 6.

3) The flange 2 is nested into the flange 1 with the apertures 4 in the respective flanges 1 and 2 aligned and so that the other side edge of the toothed ring 3 engages the recess 5 in the flange 1.

4) The flanges 1 and 2 are spot welded together at a number of peripherally spaced locations 8 adjacent the spaced apart portions of the flanges 1 and 2.

5) The toothed ring 3 is secured against rotation relative to the flanges 1 and 2 by subjecting the flanges 1 and 2 to a crimping operation which produces the aforementioned localised deformations 7.

The toothed ring 3 surrounds and abuts against a portion 9 of the flange 2 which is cylindrical and extends axially of the pulley.

The above-described assembly is much lighter in weight than previously used toothed

pulleys which are generally formed by machining from a solid block or by casting and machining, and is very economical to manufacture particularly since brazing and the use of a large number of separate spot welding operations are avoided.

Instead of being cupped, the flanges 1 and 2 may each have a central portion which is provided with the apertures 4 and which is disposed substantially radially inwardly of the ring 3.

The size and shape of the pulley, and the number and shape of the teeth thereon, will vary depending upon the intended use of the pulley.

CLAIMS

1. A pulley comprising a pair of flanges which are spaced apart axially of the pulley over peripheral portions thereof but which are configured so as to be in facial engagement over an inner portion thereof which is to be engaged with a rotary drive or driven member, and an externally toothed ring which is mounted between the spaced apart portions of the flanges and which is secured to the flanges.

2. A pulley as claimed in claim 1, wherein the teeth are solid.

3. A pulley as claimed in claim 1 or 2, wherein each flange has an annular recess adjacent its periphery, said recess receiving a respective side edge of the toothed ring.

4. A pulley as claimed in claim 1, 2 or 3, wherein the flanges have been subjected to a crimping operation to secure the toothed ring thereto.

5. A pulley as claimed in any preceding claim, wherein the toothed ring is produced by extrusion.

6. A pulley as claimed in any preceding claim, wherein the teeth are hardened.

7. A pulley substantially as hereinbefore described with reference to the accompanying drawings.